**CROSSBAR-NET: A NOVEL CONVOLUTIONAL NEURAL NETWORK FOR KIDNEY TUMOR SEGMENTATION IN CT IMAGES**

**ABSTRACT**

Due to unpredictable location, fuzzy texture and diverse shape accurate segmentation of kidney tumor in CT images is a challenging task. For this purpose, we present cascaded trainable segmentation model termed as Crossbar Net. This method combines two novel schemes: First is the cross bar patches, which consists of two orthogonal patches i.e. vertical and horizontal patches. This captures both global and local appearance information of kidney tumors from vertical and horizontal directions simultaneously. Secondly, from the obtained crossbar patches, we train two sub models in cascaded training manner. During the training, the trained sub models are encouraged to become more focus on difficult parts of tumor automatically. Then vertical sub model is required to help segment the missegmented regions for Horizontal segmented model and vice versa. And two models could complement each other for self-improvement.

**PROPOSED SYSTEM**

Here in this work, a framework of cross net comprises of two stages i.e. Training stage and testing stage. Firstly, we convert segmentation task to piecewise classification to predict a patch to be a tumor or non-tumor class. In the training stage, a crossbar patches are extracted from CT images under basic sampling strategy. Initially, vertical and horizontal sub models are trained in the 1st round. In the cascaded training process in the ‘t’ th round, the current trained horizontal and vertical sub models performance is evaluated and missegmented region of each sub model is selected. The missegmented region is resampled using covering resampled strategy to obtain corresponding resampled patches. Then this is fed to another sub model for its model training. Repeat these steps until it reach maximum round number or training error converges. In the testing stage, we are segmenting the new incoming CT images so that the trained sub models in each round are gathered together to perform majority voting on this image to obtain final segmentation.

**PROPOSED TECHNIQUE**

* CASCADED TRAINABLE SEGMENTATION MODEL
* SUB MODEL ARCHITECTURE.

**PROPOSED SYSTEM ADVANTAGES**

* Our method could capture both global and local kidney information.
* This method also evaluates cardiac segmentation in MR images and breast mass segmentation in X rays.
* This method is fast to train, although it is trained in cascaded manner.

**PROPOSED SYSTEM BLOCK DIAGRAM**

Resampled patches

Mis segmented region

Vertical patches

Resampling

CT images

Resampled patches.

Resampling

Mis segmented region

Horizontal patches

Vertical sub model

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Horizontal sub model

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**FIG 1.1: DETAILED BLOCK DIAGRAM OF TRAINING STAGE**

**DETAILED BLOCK DIAGRAM (VIDEO WATERMARKING)**

Testing images

Sampling patches

Sub models

Majority voting

Tumor or Non tumor

**FIG 1.2: DETAILED BLOCK DIAGRAM OF TESTING STAGE**

**Hardware Requirements**

The necessary hardware regarding private PC that comprises configuration as specified as follows:-

1. Processor: Intel core i3/i5.

2. Disk capability: 1GB for MATLAB only.

3. RAM: 2GB.

**Software Tool used**

The necessary program regarding private PC that comprises configuration as specified as follows:-

1. Windows 7(64-bit) operating system.

2. MATLAB version R2012a.

**Image Processing Toolbox**

Image processing device box permits carrying out image improvement, deblurring of image, characteristic identification, decreasing of noise, image segmentation, arithmetical alteration, as well as registration of image. Image processing device intended for the execution regarding methods proposed are specified below:-

1. Fundamental import as well as export

2. Display

**Features of MATLAB**

* Interactive background meant for aim investigation as well as resolving the difficulty.
* MATLAB is a sophisticated language intended for creating, calculating as well as building up a purpose.
* It contains numerical tasks such as figures, calculus, sorting out, developments, mathematical integration, as well as working out equations.
* Graphics integrated intended for visualization.
* Intended for generating traditional plot integrated equipments is accessible.
* Troubles as well as way outs are given in well-known numerical symbol.